CUBAN SEAWEEDS.

BY DR. W. G. FARLOW.

In 1865–66 Mr. Charles Wright, then engaged in collecting the phænogamous plants of Cuba, upon visiting the seashore in search of maritime plants, gathered and preserved such algæ as came within his reach. This collection, which was kindly given to me for examination by Professor Gray, contained forty-six species which could be identified, besides a few which, from absence of fruit and other causes, could not be made out. Of these forty-six species, eight were Melanosperms, nineteen Rhodosperms, and nineteen Chlorosperms. These numbers probably nearly represent the actual proportion of species of Chlorosperms and Melanosperms growing on the shores of Cuba, the latter being few in number and belonging mostly either to the genus Sargassum of the Fucaceæ, or to the tropical order Dictyotaceæ. That the number of Rhodosperms, collected by Mr. Wright, is considerably less than the actual proportion is owing to the fact that the Melanosperms and Chlorosperms are generally littoral, and could be easily reached by Mr. Wright, while the Rhodosperms are mainly found after storms, or brought up by the dredge. The present article is limited to the Chlorosperms of Cuba as illustrated by this collection.

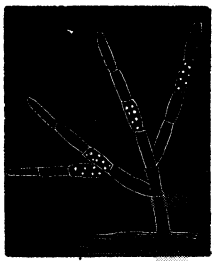
On our own coasts, the Chlorosperms, or green seaweeds, belong mainly to the Ulvaceæ and Confervaceæ. To the former order belong the grass-green apron-like weeds (Ulvæ) attached to the rocks all along our shores, and the Porphyra (Fig. 45, structure of a plant of the group) of a similar structure but smaller, and of a dark purple color, very exceptional amongst the Chlorosperms, which make the large round pebbles of our beaches so slippery at low tide. To the Confervaceæ (Fig. 46, structure of a plant of this group) of our shores, belong a multitude of species formed of small, generally microscopic, cylindrical cells placed end to end, forming sometimes branching, sometimes straight filaments. In Mr. Wright's collection is an alga (*Cladophora luteola* Harv.) belonging to this order of a most brilliant yellow color, forming tufts scarcely two inches high. Some of our own Cladophoræ are of a greenish yellow color, but we have nothing approaching in

brilliancy this little Cuban plant which possesses a color unique among the algæ.

Besides these two orders, so fully represented on our own coast,

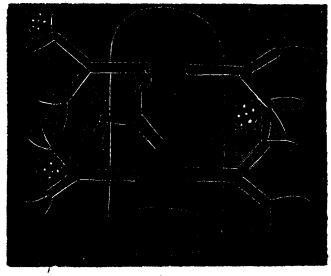
Figures showing diagram of structure in

Fig. 46.



Confervaceæ.

Fig. 48.

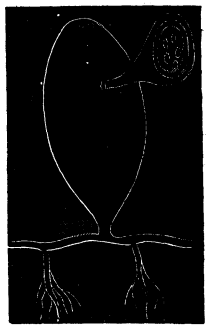


Dasycladeæ.

Fig. 49.

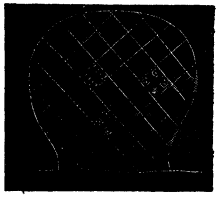
Valoniaceæ.

Fig. 47.



Siphonaceæ.

Fig. 45.



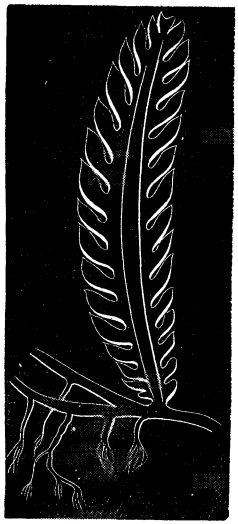
Ulvaceæ.

but so comparatively insignificant in Cuba, we have, if we except Vaucheria, a microscopic alga, the American species of which have

been but little studied, a solitary species of a third order, the Siphonaceæ, to which the most striking Cuban Chlorosperms belong. This plant is the *Bryopsis plumosa*, which grows in rocky pools and looks like a small tuft of delicate green feathers.

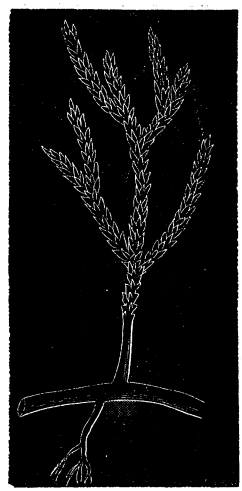
The order Siphonaceæ (Fig. 47, structure of a plant of this group) contains plants formed of a single large and generally branching cell, or of several such cells united into a frond. The mode of reproduction, as far as is known, is by zoöspores formed from the whole contents of the cell and discharged by the rupture

Fig. 50.



Caulerpa Mexicana, nat. size.

Fig. 51.



Caulerpa ericifolia, 2-3 nat. size.

of the cell-wall. In Vaucheria, antheridia* have been seen. The largest and most beautiful genus of Siphonaceæ is Caulerpa. This genus has representatives in all tropical seas, some species, as *Caulerpa clavifera*, being cosmopolitan. The single cells of which these algæ are composed are very large, being amongst the largest vegetable cells known; in *C. prolifera*, for instance, four or five inches long. The cell-wall is thick and membranous, and lined with several layers of cellulose. The sac thus formed is filled with a semi-fluid endochrome.† The peculiar character which marks the genus is the presence of branching threads which

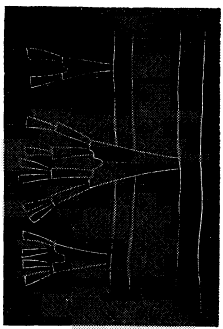
*Certain organs answering to the anthers of flowering plants.

†The coloring matter of the cells.

float in the endochrome and fill a good part of the cell. These threads are merely prolongations of the external cell-wall, and are not newly formed cells, as they contain no endochrome. Harvey has compared the Caulerpæ to loose sponges surrounded by a membranous sac.

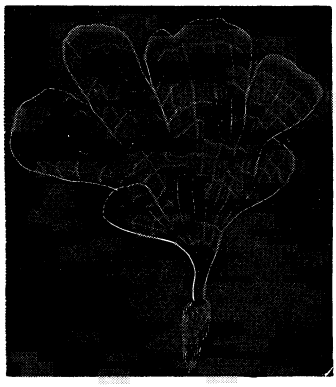
The specific distinction depends on the outline of the frond. Most of them resemble Lycopods or true mosses. In all, there is something which looks like the subterranean stem of a Lycopodium, from which fibrils resembling roots are given off. These have not the functions of roots, but only serve to fix the plant, and in consequence of these trailing stems, the Caulerpæ are able to flourish on a sandy shore where almost no other alga will grow.

Fig. 52.



Halimeda tridens, 300 diam.

Fig. 53.

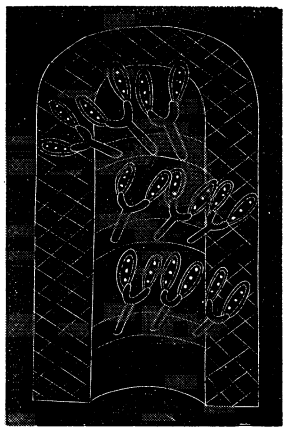


Udotea flabellata, 1-2 natural size.

From these underground stems, or surculi, grow the fronds proper, consisting of a single cell, as we have described. In *C. prolifera* the frond is simply flat and leaf-like. In *C. plumaris* it is finely pinnate, resembling little feathers. In *C. Mexicana* (Fig. 50, natural size) we have some resemblance to a Jungermannia; while in *C. Lycopodium* and *ericifolia* (Fig. 51, $\frac{2}{3}$ natural size) we have forms presenting a striking similarity to *Lycopodium clavatum* and *dendroideum*. In fact in the dried state many would mistake them for faded *Lycopodia*. The Caulerpæ grow near the shore in great patches as densely clustered as the mosses on shore. They form the lawns of the ocean, but far excel, in brilliancy of color and delicacy of form, the lawns which the most skilful gardener can produce. They are also said to form the chief food of the green turtle of our markets.

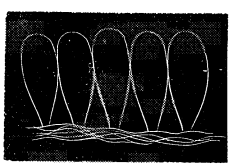
Nearly allied to Caulerpa, are Halimeda and Udotea, which are composed, not as in Caulerpa, of a single cell, but of several similar cells packed together into a frond. These genera would hardly be called plants at all by the common observer, as they are coated with carbonate of lime and resemble corals. In fact, they are corallines or algæ with a calcareous covering. In some species this coating surrounds each filament separately, in others it surrounds the collective mass of filamentous cells of which the plant is composed. Referring to these plants, Cuvier wrote, "il existe dans la mer des corps assez semblables aux polypiers par leur substance et leur forme générale aù l'on n'a pù encore apercevoir les polypes." Lamouroux, however, went farther, and described the polyps which, it is needless to say, existed only in his own imagination. At present, there is no doubt of their vegetable nature. After soaking in dilute hydrochloric acid, they can be sectioned and examined, the coating, sometimes peeling off like a shell, is occasionally perforated like a sieve, or it may gradually dissolve away. Having removed the coating, we find in Halimeda, a series of unicellular filaments which are constricted at intervals. At these constrictions, the cells branch out laterally, something like a fan, and the final ramifications of adjacent filaments, approximating each other, form the surface on which the carbonate of lime is deposited. Besides these constrictions in each filament, the whole mass is also constricted at intervals, making a necklace in which the joints grow gradually smaller. The different forms of these articulations mark the species. In the Wright collection were *Halimeda opuntia*, a tropical cosmopolitan, named from this resemblance to a prickly pear, and *H. tridens* (Fig. 52, magnified 300 diameters), in which the upper edge of each joint is three-toothed.

Fig. 54.



Neomeris dumetosa, 250 diam.

Fig. 55.

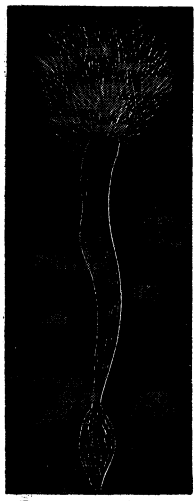


Codium tomentosum, 200 diam.

The Udoteæ look like green fans with a short handle. The type

of the genus is *U. flabellata* (Fig. 53, ½ natural size), where the stem is formed of filaments surrounded by a calcareous coating, but, as soon as these filaments reach the expanded part of the frond, they divide indefinitely into root-like branches, the ends of which are placed, as in Halimeda, to form the surface. It is the misfortune of the genus Udotea, that very few of the species conform to the type, and it is to be feared that plants, having an external, but not a microscopic, resemblance, have been huddled together into this very convenient, but not well defined genus. *U. conglutinata* seems to me nearly related to Penicillus of an-

Fig. 57.



Penicillus capitatus, 2-3 nat. size.

Fig. 56.

Acetabularia crenulata, nat. size.

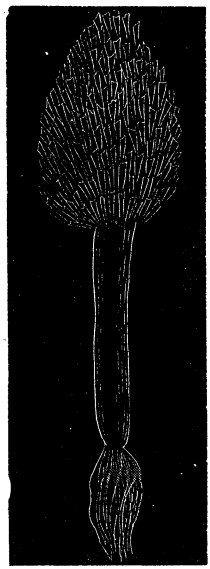
other order. Amongst Mr. Wright's plants was what appears to me a new species, nearly related to *U. flabellata*, but having a much longer stipe, and the filaments in the stipe branching as well at the upper part.

The genus Codium strongly resembles a single joint of a Halimeda, except that it has no calcareous covering, but is of about the same texture as the sponge. It consists of unicellular filaments forming an intricate mass, from the side of which filaments, grow large, obovate cells, which, lying side by side, form the surface of the frond. From the sides of these cells, in some species, smaller cells are evolved and in them the sporangium* and after-

*Spore-case, with spores produced in the centre.

wards the zoöspores,* are formed. The only species brought by Mr. Wright was *C. tomentosum* (Fig. 55, magnified 200 diameters), which is found almost everywhere, in the tropics and temperate zones except on our own coast. It is common in Europe and California, but, on our Atlantic coast, it has not been found north of Key West.

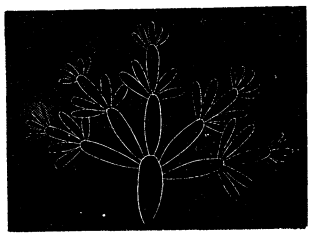
Fig. 58.



Penicillus Phœnix, nat. size.

The two orders, Dasycladeæ and Valoniaceæ, are sometimes regarded as forming a part of the Siphonaceæ. Harvey considers them independent orders. The Dasycladeæ (Fig. 48, structure of a plant of this group) comprise plants of a single axial cell surrounded at intervals by whorls of branching cells. It is a small order, represented in the Wright collection by only three species, *Dasycladus clavæformis*, *Neomeris dumetosa*, *Acetabularia crenulata*. The first named looks remarkably like a small sized, dried up, birch catkin, devoid of all interest. It consists of a large central cell, from the sides of which whorls of cells are given off, dividing trichotomously and bearing spores in the axils. The two last species are calcareous. *Neomeris dumetosa* (Fig. 54, magnified 200 diameters) as far as external appearance is concerned, is insignificant enough. being generally not more than an inch long, of a bluish green color and a granulated surface. Viewed with a low power, as half an inch objective, it is extremely beautiful. The central cell is surrounded by rings, from which the secondary cells are given off with a remarkable uniformity. These after a while divide, and each division bears a large, obovate sporangium with a double outline, filled with the most beautiful zoöspores. Enveloping the whole is a membrane composed of hexagonal cells, on which is the calcareous deposit.

Fig. 59.



Anadyomena flabellata, 10 diam.

*Locomotive spores (or seeds) of the algæ.

If the two species just mentioned were insignificant at first sight, the Acetabularia (Fig. 56, *A. crenulata*, natural size) cannot fail to delight any one. It seems as though it were a most delicate parasol made for some of the smaller crustaceans, or like a minute toadstool, except that its color and texture are much too delicate. It has a stem composed of filaments surrounded by a calcareous coating, at the extremity of which is a disk formed of radiating cells filled with zoöspores. Our species is exactly like *Acetabularia Mediterranea*, except that the edge is always crenate. There is a third species in Australia, in which the radiating cells form a shallow cup instead of a disk. In Polyphysa the cells do not coalesce at all. At some seasons of the year, tufts of green filaments grow from the summit of the stem. These are never seen in herbarium specimens.

The Valoniaceæ (Fig. 49, structure of a plant of the group), the last order which we shall mention, although regarded by some as only a sub-order of Siphonaceæ, bears, perhaps, an equally strong resemblance to Confervaceæ, only the cells are swollen and short, rather than narrow and rectangular. Some genera are calcareous, while others are filamentous or membranaceous. In this order, Harvey places the Penicilli, or salt water shaving brushes, which, were they not quite so calcareous, would answer their supposed purpose very well. Their microscopic structure seems to me to place them next to Udotea, that is, if *U. conglutinata* properly belongs to the latter genus. The present genus is not in the least related to the genus Penicillium, to which the yeast plant belongs, as might be supposed from the resemblance of the names. The latter genus belongs to the Fungi, not to the Algæ. Wright's two species were *P. capitatus* (Fig. 57, $\frac{2}{3}$ natural size) and *P. Phœnix*. The former would make a capital shaving brush. The stem is hard and solid, and three or four inches long. The separate filaments then diverge, and each receives a calcareous coating. The spores are probably borne in the root-like processes given off laterally from the filaments in the stipe. *P. Phœnix* (Fig. 58, natural size) is very much smaller, and the terminal filaments are united in threes, so that the plant looks very much like one of those remarkable trees found in the toy villages with which children exercise their imaginations.

Anadyomena flabellata (Fig. 59, magnified 10 diameters), of this order, appears membranous like a small Ulva, but it is,

in reality, only a net-work of cells. The frond begins with a single oblong cell terminating in from five to seven similar but smaller cells which in turn divide in like manner. In this way, a fan-like frond is formed. When moistened, the cells swell up and appear to be connected, but, on drying, the adjacent cell-walls separate leaving a net-work. In Mr. Wright's collection were specimens of the very curious *Blodgettia confervoides*, which Harvey at first supposed was a Cladophora, and which is now temporarily placed amongst the Valoniaceæ awaiting further developments. *Dictyosphœria favulosa*, found in all tropical seas, and *Valonia œgagrophila*, looking like a Cladophora which has been living too highly and become bloated, complete our list of Cuban Chlorosperms.

THE LESSER APPLE LEAF-FOLDER.

BY WM. LEBARON, M.D.

In the course of my investigations respecting the noxious insects of the State of Illinois, during the summer of 1870, my attention was attracted to a small, and so far as I can learn, undescribed species of moth, belonging to the genus Tortrix, the larva of which is extremely destructive to young nursery apple trees. It may be called the Lesser Apple Leaf-folder. (*Tortrix malivorana*, mihi. First Annual Report upon the noxious insects of Illinois, page 16. *)

Most of my observations upon this insect were made during a visit to the fruit farm of Mr. B. D. Wier, of Lacon, in the northern central part of the State, on the 22d of July, 1870. At

*Having occasion to refer to this report, I will take this opportunity to state, in reply to a suggestion of the Editors of the NATURALIST, that this report, being the writer's first annual Report as State Entomologist of Illinois, was published at Springfield, in accordance with a provision of the law of the State, under date of Dec. 15th, 1870. The whole edition, numbering five thousand copies, was destroyed by the burning, on the 23d of February, 1871, of the Public Bindery in which these reports and other State documents were deposited, for the purpose of being put in convenient form for distribution. As no action has been taken, up to the present time, by the General Assembly, upon the subject of reprinting the lost documents, it is not probable that it will be done. In this event, such parts of the report as are deemed most worthy of preservation will be incorporated in the author's next annual Report.